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Original communication

Treatment outcomes of chemical castration on Korean sex offenders

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ABSTRACT

After the recent enactment of the chemical castration legislation for sex offenders in Korea, we sought to report primary treatment outcomes for 38 patients at the National Forensic Hospital since 2011. After chemical castration, these patients experienced reductions in frequency and intensity of sexual drive, frequency of masturbation and sexual fantasies. The incidence of adverse effects was similar to that of previous reports. Serial hormonal evaluations showed an association between testosterone level and degree of paraphilic and non-paraphilic sexual thoughts. A notable finding was an unexpected upsurge of testosterone levels with intense sexual drive and fantasy observed during the first 2 months after cessation of treatment. This suggested the need for a temporary anti-androgen therapy or close surveillance during this period. When proper precautions are taken, chemical castration may be an effective treatment strategy for paraphilic and non-paraphilic sex offenders.

1. Introduction

Attempts at using hormonal manipulation to control pathological sexual behaviour and to prevent sexual offenses have been reported since the 1940s.[1] Recently, androgen-deprivation treatment (ADT), commonly referred to as chemical castration, has been employed as a supportive measure in addition to psychotherapy for treatment of sex offenders in many Western countries.[2] Sexual offences are crimes that violate the integrity of the community and are of concern to the general public. As a result, legislation to prevent repeat offences has often been driven by both the public and the media. Despite evidence that chemical castration with or without psychotherapy can successfully reduce recidivism rates,[3] the criminal justice systems in many countries are reticent to endorse this legislation given concerns regarding preservation of human rights, adverse effects and cost.[3,4] In response to ongoing public demands for implementation of community safety measures, the Ministry of Justice of Korea enacted a legislation in 2011 requiring chemical castration of sexual offenders whose victims are minors under the age of 16. Two chemical agents have been approved for sex offender treatment including an anti-androgen, cyproterone acetate (CPA), and a gonadotropin-releasing hormone (GnRH) agonist, leuprolide acetate (LA). While chemical castration has been mandatory for sex offenders since 2011, prior detainees at the National Forensic Hospital who were under consideration for parole or probation were candidates for voluntary treatment. In this study, we sought to report preliminary data on psychobehavioural and clinical outcomes of short-term ADT in Korean sex offenders.

2. Materials and methods

2.1. Participants

This prospective cross-sectional analysis included 121 patients at the National Forensic Hospital who were imprisoned for sexual offenses. After a detailed explanation of the therapeutic effects and possible risks of chemical castration, 61 patients volunteered to receive ADT in an attempt to self-alleviate excessive sexual aberrancy. Participation was completely voluntary and was not a condition of parole or probation. None of the subjects had received prior ADT or had contraindications to receiving ADT.[5] Seven patients had osteopaenia according to the World Health Organization's definition; however, they were willing to receive the treatment despite risk.[6] After obtaining written consent, LA 3.75 mg subcutaneous depot injection was given monthly.

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Cognitive-behavioural therapy did not begin or end during the ADT period for any of the subjects. After 3 months of treatment, 34 patients chose to discontinue treatment while four out of seven patients who had osteopaenia were advised to discontinue due to further reduction of bone mineral density (BMD). Psychobehavioural and clinical outcomes of these 38 patients who received ADT for a period of 3 months were investigated.

2.2. Baseline risk assessment

Prior to treatment, all patients were evaluated for psychiatric conditions, baseline body mass index, testis size, gynaecomastia, BMD, sex offender risk assessment and Wilson's Sex Fantasy Questionnaire (SFQ). Sex offender risk was assessed according to the indication scale proposed by Maletzky et al.,[7] of which an individual's score superior or equal to seven was considered an indication for ADT. All participants of the study were eligible to undergo ADT. The distribution of each risk-scale items is presented in Table 1. Wilson's SFQ was used to evaluate treatment effects of ADT on sexual fantasies. This scale provided a method of quantifying sexual fantasies, preferences and experiences in a standardised manner. The scale is composed of four categories, each evaluating different types of sexual fantasies: exploratory, intimate, impersonal and sadomasochistic. A total score was calculated by summing the scores for each category, providing an indirect measurement of overall sex drive or libido.[8] Laboratory tests including complete blood cell count, serum chemistry, prostate-specific antigen and measurement of sex hormones such as testosterone, luteinising hormone (LH), follicle-stimulating hormone (FSH) and prolactin (all obtained from Abbott®) were performed in all participants.

2.3. Follow-up evaluations

Follow-up measurements of sex hormones were performed weekly during the on-ADT period and until the first month of the off-ADT period, and then monthly afterwards. Follow-up for other examinations and tests were conducted based on the World Federation of Societies of Biological Psychiatry (WFSBP) guidelines for the biological treatment of paraphilias.[9]

2.4. Evaluation of psychobehavioural outcomes

To evaluate the efficacy of ADT, self-completed questionnaires inquiring the presence of reduction in frequency and intensity of sexual thoughts and frequency of masturbation were distributed after the 3 months of treatment. To evaluate therapeutic effects on sexual fantasies, Wilson's SFQ was distributed on the last day of the on-ADT period and after 1 year following off ADT. All questionnaires were submitted anonymously to maximise the objectivity of the test results.

Table 1
Distribution of sex offender risk-scale items among study participants.

Assessment item	*n* (%)
Several victims	21 (55%)
Several paraphilias	4 (11%)
Deviant sexual interest and behaviour	9 (24%)
Don't live with the victim	31 (82%)
Use of strength during sex offending	12 (32%)
Male victim	7 (18%)
Brain dysfunction	3 (8%)
Previous psychiatric history	2 (5%)
Sex offending as outpatient	37 (%)
Sex offending within institution	2 (5%)
Previous treatment failure	3 (8%)

Table 2
Psychiatric diagnoses of patients treated with ADT.

Psychiatric diagnosis	*n* (%)
Pedophilia	17 (45%)
Paraphilia NOS	8 (24%)
Mental retardation	3 (8%)
Voyeurism	2 (5%)
Fetishism	2 (5%)
Personality disorder	2 (5%)
Exhibitionism	2 (5%)
Impulse control disorder	1 (3%)
Conduct disorder	1 (3%)

Data analysis was performed using SPSS software version 18 for Windows (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used to analyse the frequency of events and Mann–Whitney *U*-tests were used to compare treatment effects in patients receiving ADT vs. controls. A p-value of <0.05 was considered to be statistically significant.

3. Results

3.1. Patient demographics

Baseline psychiatric diagnoses of the 38 patients who underwent ADT are shown in Table 2. All subjects were male, and the mean age was 33.4 (range 17–51) years. Six (16%) patients were under the age of 19 years at the time that they committed sexual assault; 21 (54%) patients had been convicted of sexual abuse of a child under the age of 13; three (6%) patients had been convicted of incest.

3.2. Effects of ADT on sex hormone levels

LA 3.75 mg subcutaneous depot injections were administered to patients for 3 consecutive months, followed by an observational off-ADT period of 14 months. Fig. 1 illustrates the trends of testosterone, LH and FSH levels at baseline and during on and off periods of ADT. Compared to baseline testosterone levels, ADT notably reduced testosterone levels to a nadir at the treatment 'end' point (4.97 ± 1.6 vs. 0.53 ± 0.45 ng ml^{-1}; $p < 0.001$). A flare phenomenon was observed during the second week of therapy, with a significant upsurge of mean testosterone compared to mean baseline levels (8.74 ± 3.65 vs. 4.97 ± 1.6 ng ml^{-1}; $p < 0.001$). During the 14-month off-ADT period, at least 10 months were needed for testosterone levels to normalise to baseline. Although a

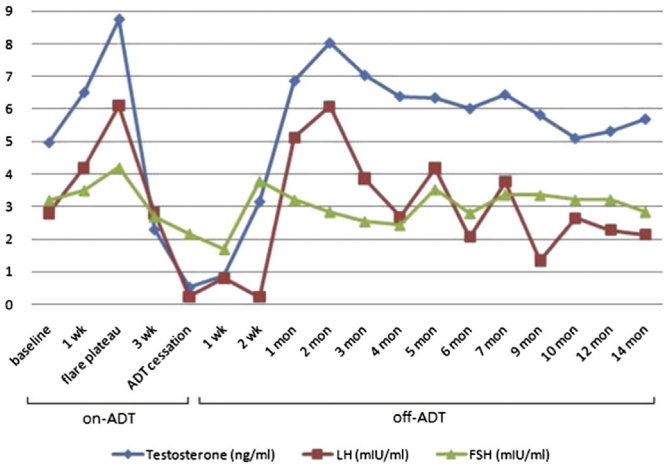

Fig. 1. Effect of 3-months ADT on sex hormones levels.

Table 3
Effect of 3 months ADT on reduction of sexual thoughts and masturbation frequency.

Events	*n* (%)
Reduction of frequency of sexual thoughts	29 (76%)
Reduction of intensity of sexual thoughts	27 (71%)
Reduction of masturbation frequency	28 (74%)

gradual upward normalisation of the testosterone level was expected, an abrupt upsurge was observed during the first 2 months of the off-ADT period and was subsequently followed by a slow, gradual decline back to baseline. This upsurge surpassed the initial baseline level of testosterone (8.02 ± 3.21 vs. 4.97 ± 1.6 ng ml^{-1}; $p < 0.001$) and nearly reached the plateau observed during the flare period. As expected, changes in LH and FSH levels correlated with changes in testosterone according to the hormonal biophysiology of the hypothalamic–pituitary–gonadal axis.

3.3. Treatment effects on the frequency and intensity of sexual thoughts, frequency of masturbation and frequency of sexual fantasies

Reductions in frequency and intensity of sexual thoughts were observed in 29 (76%) and 27 (71%) of the patients, respectively. Reduction in the frequency of masturbation was observed in 28 (74%) of the patients (Table 3). The effects of ADT on the sexual fantasies of patients were compared in relation to 60 age-matched controls who were considered to possess non-deviant sexual interest and behaviour as noted by Wilson's SFQ (Table 4). Total Wilson's SFQ scores significantly decreased with ADT (62.9 ± 44.6 vs. 20.8 ± 18.7, $p < 0.01$). All scores in the four subcategories of the SFQ were significantly reduced including exploratory (15.1 ± 11.9 vs. 3.7 ± 4.5), intimate (23.4 ± 15.9 vs. 10.0 ± 8.4), impersonal (18.4 ± 12.1 vs. 5.3 ± 4.9) and sadomasochistic fantasies (6.0 ± 7.2 vs. 1.8 ± 2.9) ($p < 0.01$). At 1 year following ADT cessation, SFQ scores tended to return towards pre-treatment levels ($p < 0.01$).

3.4. Adverse effects

During the 3-month on-ADT period and the following off-ADT period of a median 9.3 months, adverse effects were reported in 26 (68%) patients. Mild side effects included hot flashes, weight gain and injection site pain, and moderate to severe side effects included BMD loss and depressed mood. Table 5 illustrates the frequency of each of the observed side effects. The most disquieting side effect of ADT was the loss of BMD, which was observed in four (11%) patients.

4. Discussion

ADT has been shown to reduce sexual interest, performance of sexual acts and rates of recidivism.[10,11] Independent of the strong influence that psychiatric factors play with respect to criminal sexual offences, these findings suggest that the biology of sexual drive and arousal is primarily mediated by testosterone.[12–15] We report similar results in that sexual drive and fantasy were suppressed after ADT despite a variety of baseline psychiatric disorders. Indeed, our expectation is that this reduction in sexual drive will result in a reduction in recidivism.

Table 4
Effects of 3 months ADT on reduction of sexual fantasies based on Wilson's SFQ.

Fantasy factors	Wilson's SFQ Normal group ($n = 60$)	ADT participants ($n = 38$)		
		Pre-ADT	ADT cessation (84th day)	1 yr following ADT cessation
Exploratory	13.7 ± 8.1	15.1 ± 11.9	3.7 ± 4.5*	12.4 ± 10.1
Intimate	21.9 ± 10.5	23.4 ± 15.9	10.0 ± 8.4*	20.8 ± 13.9
Impersonal	11.4 ± 6.5	18.4 ± 12.1	5.3 ± 4.9*	13.4 ± 9.8
Sadomasochistic	4.3 ± 4.2	6.0 ± 7.2	1.8 ± 2.9*	6.5 ± 8.1
Total	51.3 ± 24.7	62.9 ± 44.6	20.8 ± 18.7*	53.1 ± 39.9

Values are given as means ± SD.
*$p < 0.01$ in relation to values at pre-ADT and 1 yr following ADT cessation.

Table 5
Adverse effects of ADT.

Events	*n* (%)
Hot flashes	17 (45%)
Weight gain	11 (29%)
Testis size reduction	9 (24%)
Depressive mood	8 (21%)
Injection site pain	7 (18%)
Myalgia	4 (11%)
Reduction of BMD	4 (11%)
Injection site granuloma	2 (5%)
Decreased body hair	2 (5%)

Administration of medications for the treatment of sex offenders began as early as the 1940s.[1] Representative studies include that of Laschet et al.,[16] which was one of the first studies to report the use of CPA to decrease sexual interest and fantasies. Allolio et al.[17] described the first patient with paraphilic symptoms to be successfully treated with a GnRH agonist. It was not until 2011, however, that the Ministry of Justice of Korea officially approved the use of these drugs for the reversible reduction of testosterone to castrated levels in order to decrease sexual drive in men over the age of 19, with sexual deviation towards children under the age of 16. Other indications for mandatory ADT include the diagnosis of paraphilia after sexual assault on victims regardless of age, or those at high risk of recidivism.

The medication used in this study was LA, which acts by initially stimulating GnRH receptors in the pituitary gland, resulting in a so-called 'flare phenomenon'. This flare lasts for approximately 2 weeks but eventually causes desensitisation and down-regulation of GnRH receptors, resulting in decreased secretion of LH and FSH. This decreased LH secretion, in addition to down-regulation of LH receptors in the testes, leads to decreased stimulation of Leydig cells and thus decreased synthesis of testosterone.[13,18,19] LA has been primarily utilised for the treatment of hormone-sensitive prostate cancer but has emerged as an alternative for treatment of sex offenders as it is an injectable drug.[20]

ADT did not successfully reduce frequency and intensity of sexual thoughts of all patients. This could be due to the short duration of ADT treatment and is a limitation of our study. However, the current chemical castration legislation calls for a psychiatric evaluation of a sex offender, and ADT is performed 3 months prior to probation so that the treatment may effectively change the behaviour of the offender. Therefore, the immediate effect of short-term ADT was considered worth investigating. Our results indicate that while there may be some variability between individuals, 70–80% of patients show a treatment effect after 3 months. The high rate of response to ADT in our subjects may have been attributed to a placebo response due to the lack of a control group. Schober et al.[21] observed continuous suppression of sexual behaviour in patients receiving placebo following ADT. This indicates that a placebo effect may exist regarding the complexity of cognitive-behavioural interaction as of this treatment setting. It is of note that sexual drive was not always suppressed in those with castrated levels of testosterone, and therefore a thorough psychiatric evaluation is essential prior to release back into the community. Reductions in total Wilson's SFQ score as well as each individual subscore were observed in our subjects. However, it was noteworthy that following a year from ADT cessation, scores tended to

return towards baseline levels. This finding impels the necessity of continuously prescribing ADT or performing serial hormonal and psychiatric evaluations once treatment has been discontinued.

Various side effects of ADT medications have been described, most of which are the results of reduced testosterone levels.[22–24] The most frequently observed adverse effects in this study included hot flashes, weight gain, testis atrophy, depression and injection site pain. All of these effects resolved after conservative treatment and supportive psychotherapy. In order to prevent bone mineral loss, prophylactic and therapeutic managements such as calcium and vitamin D supplementation, bisphosphonate treatment or low-dose androgen supplementation are commonly recommended.[7] All patients were provided with prophylactic oral calcium supplements and vitamin D. Despite this, BMDs of four initially osteopaenic patients fell to the osteoporotic level. Although short-term ADT was unlikely the cause of this reduction, therapy was terminated due to risk of fracture and the patients received close follow-up. Injection site granulomas in patients undergoing ADT have been rarely reported,[23] though two cases of injection site granulomas were observed among our participants. One of these cases spontaneously resolved, while an incision and drainage was performed on the second patient to prevent further tissue damage. It is likely that these granulomas resulted from the vehicle of injection rather than the drug itself.[23] Most side effects were reversible after cessation of therapy. Fortunately, severe side effects reported in previous studies such as thrombo-embolism and renal or hepatic dysfunction were not observed in our participants.[19]

The most noteworthy finding in our study which had not been previously reported was the upsurge of testosterone levels during the first 2 months of the off-ADT period. This upsurge, which was almost to the level of the flare period plateau, was confirmed by both serial testosterone measurements and an upsurge of self-reported sexual drive by the patients themselves. Although objective scores were not obtained due to the unexpected nature of this phenomenon, patients subjectively reported uncontrollable sexual intensities and fantasies during this certain time period. Currently, legislation for chemical castration of paedophiles in Korea allows for ADT 3 months prior to probation. Although a global-positioning-system anklet is provided for these offenders, its efficacy in preventing recidivism is questionable. Thus, additional measures should be taken for these potential re-offenders, especially during this off-ADT period. Prescribing a short course of oral anti-androgen therapy in order to prevent this testosterone surge along with follow-up measurements of serum testosterone levels could be helpful in these cases, as could delaying probation until testosterone levels are on a steady decline.

Cautious interpretation of our results is necessary due to our short-term cross-sectional study design and lack of instruments for objective assessment. One major issue is the potential for strong biases to develop in incarcerated subjects who may not be willing to incriminate themselves on self-reported surveys. These subjects may also have lower than average intelligence, personality disorders or overall reduced levels of functioning compared to the sex offender population as a whole. Another limitation of our study is the small uncontrolled sample size. For better understanding of ADT's effectiveness, side effects and capacity to lower recidivism rates, a randomised placebo-controlled clinical trial with a longer follow-up period is needed. Moreover, various objective assessment tools such as polygraphs or penile plethysmographs could improve the measurement of treatment efficacy.

5. Conclusion

Progress has been made in the treatment of paraphilic and non-paraphilic sexual disorders that can be applied to sex offenders as a group. However, with deeper insight into hormonal manipulation, tailored modifications in treatment regimens for each individual will increase treatment success rates. ADT is an effective method for reducing sexual drive in Korean sex offenders with minimal side effects.

Ethical approval

None declared.

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Conflict of interest

All authors have no conflict of interests to declare.

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